UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER OF PATENTS AND TRADEMARKS
Washington, D.C. 20231
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/666,382	09/20/2000	Xiao-Dong Sun	RD-27,624	6126

25101 7590 02/05/2003

PHILIP D FREEDMAN, PC
6000 WESTCOTT HILLS WAY
ALEXANDRIA, VA 22315

EXAMINER
SODERQUIST, ARLEN

ART UNIT	PAPER NUMBER
1743	

DATE MAILED: 02/05/2003

7

Please find below and/or attached an Office communication concerning this application or proceeding.

AS-7

Office Action Summary

Application No.	Applicant(s)
09/666,382	Sun
Examiner	**Art Unit**
Arlen Soderquist	1743

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136 (a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1) ☒ Responsive to communication(s) filed on *Dec 9, 2002* .

2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.

3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11; 453 O.G. 213.

Disposition of Claims

4) ☒ Claim(s) *1-34* is/are pending in the application.

4a) Of the above, claim(s) _____ is/are withdrawn from consideration.

5) ☐ Claim(s) _____ is/are allowed.

6) ☒ Claim(s) *1-34* is/are rejected.

7) ☐ Claim(s) _____ is/are objected to.

8) ☐ Claims _____ are subject to restriction and/or election requirement.

Application Papers

9) ☐ The specification is objected to by the Examiner.

10) ☐ The drawing(s) filed on _____ is/are a) ☐ accepted or b) ☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13) ☐ Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a) ☐ All b) ☐ Some* c) ☐ None of:

1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____ .
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

*See the attached detailed Office action for a list of the certified copies not received.

14) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).

a) ☐ The translation of the foreign language provisional application has been received.

15) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s). _____
4) ☐ Interview Summary (PTO-413) Paper No(s). _____
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other:

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

2. Claims 1-34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Xiang (US 6,048,469) in view of Schultz (US 5,985,356) and Salomaa. In the patent Xiang teaches advanced phosphors discovered through combinatorially synthesizing candidates and then testing them for luminescence. Figure 2 shows a system for the synthesis of the candidate materials which is substantially similar to the instantly claimed device. The system has up to 8 inkjet heads connected with various chemical reservoirs used in making the various candidate compositions. Column 5, line 60 to column 6 line 12 describes the system including the substrate having wells and the motorized x-y stage that the support is attached to for the deposition part of the synthesis. Column 6, lines 13-22 teach using the system to produce libraries that are processed in different atmospheres at different temperatures to obtain different photoluminescent images by color photography under broad UV irradiation. When one looks at column 5, lines 5-15, the full understanding of this heat treatment and the inherent need for a furnace to provide the heat treatment becomes totally clear. The patent differs from the instant claims in that the inkjet is not a positive displacement dispenser.

In the patent Schultz teaches the combinatorial synthesis of novel materials. Table 1 teaches that emission is one of the possible properties that can be examined for the materials that

are synthesized. Column 20, line 18 to column 24, line 53 discuss the formation of these materials through delivery of them to a substrate by a dispenser. Column 20 lines 19-29 teach that dispensers can be utilized to generate diverse combinations of reactant components in the form of droplets or powder on a single substrate. Particularly relevant is that commercially available micropipetting apparatus can be adapted to dispense droplet volumes of 5 nanoliters or smaller from a capillary. Such droplets can fit within a reaction region having a diameter of 300 μm or less when a non-wetting mask is employed. In some embodiments, the micropipette is accurately and precisely positioned above the reaction, as described in the specification, before the reactant solution is deposited. Also taught is the use of multiple dispensers. In column 22, lines 17-37 the manner in which the dispenser(s) can dispense the components is explained using an inkjet dispenser as an example of a preferred dispenser.

In the patent Salomaa teaches a liquid handling system for performing automatic transfer of liquid samples between a plurality of receptacles. More specifically, it is directed to a system for filling, or transferring liquid samples between, a multiplicity of separate liquid receptacles, such as is required in initial filling and serial dilution of liquid samples in microtiter trays where each receptacle holds only about one tenth to ten milliliters of liquid. Such a serial dilution system basically involves mixing the sample with successively increasing proportions of a diluent in separate receptacles thereby to obtain a series of successively decreasing concentrations of the sample. The various sample concentrations can then be assayed to determine a particular property. The figures show the microtiter plate on a table (10) that is movable to place the microtiter plate under the positive displacement dispensers (36) which as shown in figure 3 have a plunger rod (40) for each dispenser.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate a commercially available dispenser(s) such as that of Salomaa into the Xiang device because of their known use in creating gradients of compositions as taught by Salomaa and because of the recognition by Schultz that commercially available dispensers are capable of dispensing components for creating materials that are subsequently evaluated for properties such as luminescence (emission).

3. Claims 1-34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Xiang (US 6,048,469) in view of Schultz (US 5,985,356), Jorgensen and Stahli (last two newly cited and applied). In the patent Xiang teaches advanced phosphors discovered through combinatorially synthesizing candidates and then testing them for luminescence. Figure 2 shows a system for the synthesis of the candidate materials which is substantially similar to the instantly claimed device. The system has up to 8 inkjet heads connected with various chemical reservoirs used in making the various candidate compositions. Column 5, line 60 to column 6 line 12 describes the system including the substrate having wells and the motorized x-y stage that the support is attached to for the deposition part of the synthesis. Column 6, lines 13-22 teach using the system to produce libraries that are processed in different atmospheres at different temperatures to obtain different photoluminescent images by color photography under broad UV irradiation. When one looks at column 5, lines 5-15, the full understanding of this heat treatment and the inherent need for a furnace to provide the heat treatment becomes totally clear. The patent differs from the instant claims in that the inkjet is not a positive displacement dispenser.

In the patent Schultz teaches the combinatorial synthesis of novel materials. Table 1 teaches that emission is one of the possible properties that can be examined for the materials that are synthesized. Column 20, line 18 to column 24, line 53 discuss the formation of these materials through delivery of them to a substrate by a dispenser. Column 20 lines 19-29 teach that dispensers can be utilized to generate diverse combinations of reactant components in the form of droplets or powder on a single substrate. Particularly relevant is that commercially available micropipetting apparatus can be adapted to dispense droplet volumes of 5 nanoliters or smaller from a capillary. Such droplets can fit within a reaction region having a diameter of 300 μm or less when a non-wetting mask is employed. In some embodiments, the micropipette is accurately and precisely positioned above the reaction, as described in the specification, before the reactant solution is deposited. Also taught is the use of multiple dispensers. In column 22, lines 17-37 the manner in which the dispenser(s) can dispense the components is explained using an inkjet dispenser as an example of a preferred dispenser.

In the paper Jorgensen discusses fully automated membrane dispensing in nanoliter scale and its application in sensor manufacturing. The rising degree of miniaturization in sensor technology and the efforts to make industrial use of it require an adequate solution for coating of sensors with membranes needed for various applications. A fully automated dispensing device was developed which is capable of dispensing droplets in nanoliter range with high accuracy and reproducibility. The device combines a three axles positioning system with a pattern recognition system and a dispensing valve and is suited for industrial mass production of sensors (page 207). Up to 150 droplets per minute are possible. Positioning accuracy is below three micrometer and standard deviation of the dispensing process is 2% or lower. The reproducibility of the process is independent from properties of the medium to be dispensed such as viscosity or solvent and shows no dependence on dispensing parameters such as needle diameter or dispensing time. The measurement of dissolved oxygen in a liquid solution serves as application example to show the practical suitability of the dispensing device.

In the patent Stahli presents an automatic pipetter utilizing a syringe having several openings at its end. A different tubing segment connects with each of these openings and extends into different vials of liquids. Of these vials, one contains a buffer solution generally used in appreciably greater quantities than the others. Another vial receives the liquids from the syringe. As a stepping motor partially withdraws the piston from the syringe, a tube leading to a vial with unmeasured liquid is open. When the stepping motor reinserts the plunger into to the syringe, the tube leading to the receiving vial becomes open while the other tubes remain closed. The tubing segments extending between the syringe and the vials include three sections. The section closest to the syringe, formed from polyimide, undergoes a minimal change in its volume notwithstanding the negative and positive partial pressures exerted by the piston. The second section, having a plasticized polyvinyl chloride construction, has greater flexibility than the polyimide portion. Pinching off this flexible section from the outside provides a valving device for the system. The last section of the tubing consists of stainless steel and runs into the vial to provide a high degree of rigidity. Coating the inside with dimethyldichlorosilane reduces its rusting and cross-contamination between pipetted liquid. In operating the pipetter, the buffer

should follow the other liquids placed into a single container. This washes the syringe between samples and avoids carry-over error from one sample to the next. After expelling fluid from the syringe, the stepping motor moves at least one step in the direction of withdrawing the piston but with the outlet open. This removes the slack in the coupling between the motor and the piston and increases the accuracy in the volume of sample drawn into the syringe. The pipetter, when called upon to deliver a microliter of a particular liquid, will deliver from 0.98 to 1.02 microliters at least 90 per cent of the time. Column 10 discusses how the stepper motor is operated and teaches that for 20 steps of rotation, the apparatus moves 1 microliter of fluid (the device is capable of moving less that one microliter of fluid). Column 13, lines 1-34 teach the use of computer control of the motor speed relative to sample size or viscosity. The section also teaches the versatility of the device in being automatically controllable to dispense one liquid; formulate a solution of several liquids; prepare several solutions; or take a liquid from one of the vials and place it in several others.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate a commercially available dispenser(s) such as that of Stahli into the Xiang device because of their known use in formulating mixtures, preparing multiple solutions and handling viscose materials as taught by Stahli and Jorgensen and because of the recognition by Schultz that commercially available dispensers are capable of dispensing components for creating materials that are subsequently evaluated for properties such as luminescence (emission).

4. Applicant's arguments filed December 9, 2002 have been fully considered but they are not persuasive. Relative to the positive-displacement dispenser, the claim is being treated as requiring some form of a plunger or its equivalent which by its movement in a syringe body for example causes movement of fluid into and out of the dispenser. With respect to this applicant treats all of the dispensers disclosed by Schultz as failing to meet this limitation. This position is in error as can be clearly seen from the dispensers of Salomaa reference and the newly cited and applied Stahli reference which one of ordinary skill in the art would have clearly recognized as fitting in the micropipettor category discussed by Schultz. Other examples of positive

displacement micropipettors can be found in the cited Stanchfield, Cummins, Marcelli, Souvaniemi, Sekine and Lancaster references. Thus contrary to applicant's urging Schultz does clearly teach the use of positive displacement dispensers in the preparation of combinatorial composition for the broad range of materials covered by the reference. Relative to the urging by applicant that Salomaa is not analogous art, applicant is viewing the reference in an overly narrow manner. After all Salomaa teaches a liquid dispenser which is being used to create mixtures of at least two liquids in different proportions which is clearly what the primary Xiang reference is doing. Thus Salomaa is clearly analogous art and would show the ability to form such mixtures automatically by a plurality of positive displacement dispensers. Since the Schultz reference clearly teaches a variety of dispensers are possible, known properties of a pipette type of dispenser such as accurate positioning or known abilities to handle viscose liquids with accuracy and precision would not have come from the teachings of applicant. In particular applicant is referred to the newly cited and applied Jorgensen and Stahli references. Relative to the claimed volumes, Xiang teaches volumes using the inkjet (column 5) of at least between 50 nanoliters to 5 microliters. The range could clearly cover the claimed range since a single drop is smaller than a nanoliter and there appears to be no requirement for the system to stop at 10,000 drops. From the Jorgensen reference it is clear that delivery of volumes through a pipette (needle) in the nanoliter range is clearly possible. From the Stahli reference it is clear that delivery of fluid at least covering the specific range taught by Xiang is possible with a micropipettor. These two references also clearly deal with any issues of viscosity. Relative to claim 26 and the reiteration step see column 4 line 42 to column 5 line 45 of Xiang which teaches first generation of potential candidates on a first set of sputtering targets (column 4 lines 62-65) in which new tricolor thulium phosphors were found. Because of a recognition that these type of phosphors have complicated energy level schemes resulting in it being difficult to find a host lattice that will maximize only one type of emission with high efficiency, a second set of libraries were formed using a second set of sputtering targets (column 5 lines 30-45). Likewise the furnace and evaluator is covered through the temperature processing and evaluation of the libraries of Xiang. Relative to a particle suspension see at least Schultz column 26, lines 28-33.

5. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The additional references are directed to either the discovery/optimization of phosphore materials or liquid dispensers usable to transfer fluids into multiwell substrates and plates. Of apparent relevance to the instant claims is an apparent admission in the Sun MRS Bulletin article in the paragraph bridging pages 310-311 that a commercial automated liquid dispenser was used. This paragraph references a figure 2a which appears to be equivalent to instant figure 1. Applicant's assistance in determining how the instantly claimed dispensing system (claims 27+) differs from the commercial automated liquid dispenser disclosed by the Sun reference.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Arlen Soderquist whose telephone number is (703) 308-3989. The examiner's schedule is variable between the hours of about 5:30 AM to about 5:00 PM on Monday through Thursday and alternate Fridays.

For communication by fax to the organization where this application or proceeding is assigned, (703) 305-7719 may be used for official, unofficial or draft papers. When using this number a call to alert the examiner would be appreciated. Numbers for faxing official papers are 703-872-9310 (before finals), 703-872-9311 (after-final), 703-305-7718, 703-305-5408 and 703-305-5433. The above fax numbers will generally allow the papers to be forwarded to the examiner in a timely manner.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.

Arlen Soderquist

January 28, 2003

ARLEN SODERQUIST
PRIMARY EXAMINER